

REMARKS

Favorable reconsideration and allowance of this application are requested.

**1. Request for Continued Examination**

As a procedural note, the present amendment is being filed concurrently with a formal Request for Continued Examination (RCE) under 37 CFR §1.114. Accordingly withdrawal of the "finality" of the January 18, 2011 Official Action is in order so as to allow entry and consideration of the amendments and remarks presented herewith.

**2. Discussion of Amendment**

By way of the amendment instructions above, the pending claims herein have been amended so as to clarify the claimed subject matter and to emphasize that the presently invention is for the whitening of annatto-containing whey. Support for such amendment can be found on page 4, lines 24-27 of the originally filed specification which notes that:

*"For some cheeses natural colouring agents like annatto or beta-carotene are used as food colouring agents. However, this colouring agent will also be present in the whey. When this whey is further processed into for example baby formula, the colour of the whey product may be undesirable."*

Claims 4 and 13-14 have been canceled without prejudice or disclaimer. In addition, claim 15 has been newly presented and is directed toward a process for whitening annatto-containing whey comprising contacting an annatto-containing whey with a beta-carotene converting enzyme obtained from *Marasmius scorodonius*. Support for such new claim exists on page 4, lines 24-27 as noted above as well as page 4, line 29 through page 5, line 5.

Therefore, following entry of this amendment, claims 1-3, 5-9, 11-12 and 15 will remain pending herein for consideration. As will become evident from the following discussion, the pending claims herein are patentable over the applied references of record.

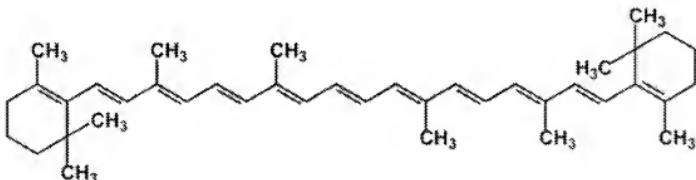
### 3. Claim Rejections – 35 USC §103

The only issues remaining to be resolved in this application are the rejections of the prior claims advanced under 35 USC §103(a).

#### A. Rejection based on Hass in view of Zorn

Haas (USP 1957336) relates to decolorizing of carotin, the yellow pigment found in grains, seeds, plants and other vegetation (page 1, lines 35-37). On page 2 it is described that the bleaching agent used is entirely of vegetable origin and is probably an enzyme or enzyme-like substance (lines 30 and 31). Page 2 further describes that the most practical source of this enzyme material or bleaching agent is soy-bean (page 2, lines 66-68).

Zorn (Applied Microbiology and Biotechnology 62:331-336 (2003)) refers to beta, beta-carotene only. This makes sense in view of the desired flavor development by Zorn because beta, beta-carotene comprises two ring structures which can be cleaved off. These cleaved off ring structures will thus comprise compounds which result in natural volatile compounds. Specifically, the structure of beta-carotene is shown below.



Zorn et al are silent in respect of non-ring comprising structures. Zorn et al do not hint or suggest that also non-ring comprising structures could be a substrate for the enzyme produced by, for example *M. scorodonioides*.

Annatto is a food additive (E number E160b) and is a mixture of bixin and norbixin.<sup>1</sup> The fat soluble part of annatto is called bixin while the water soluble part is called norbixin, and both share the same E number as annatto.



Chemical structure of *trans*-bixin



Chemical structure of norbixin

As can be seen from the above structures, bixin and norbixin do not comprise any ring structures and as a consequence cleavage of these compounds do not result in natural volatile compounds.

Zorn et al do not disclose or suggest that any of the tested filamentous fungi and yeast is capable of cleaving a structure other than beta, beta-carotene, let alone that any of these fungi or yeast could use annatto as a substrate.

Therefore, the presently claimed invention is patentably unobvious over Zorn et al when combined with Hass.

<sup>1</sup> See <http://en.wikipedia.org/wiki/Annatto>

B. Rejection based on Sugio et al in view of Zorn et al

The comments above with respect to Zorn are equally germane to the unobviousness of the pending claims based on its combination with Sugio et al (WO 02/086114).

Sugio et al describe a lipoxygenase from *Magnaporthe salvinii*. As was noted previously on the record, a lipoxygenase has an *indirect* bleaching effect. This is described in Sugio et al. as well. On page 1, lines 6-8 it is described that lipoxygenase uses the oxygenation of polyunsaturated fatty acids and produces hydroperoxides. It is the action of the peroxide which results in bleaching.

On page 9 the sections "Spectrophotometric assay" and "Bleaching assay" make clear that the peroxide reacts on a substrate (in both cases linolenic acid) (i.e. an indirect effect) and not directly on a pigment.

Zorn et al would not lead an ordinarily skilled person to expect that annatto comprising whey could be whitened in the manner claimed. Therefore, combining Zorn et al with Sugio et al would not result in the presently claimed invention.

C. Rejection based on Roos et al in view of Zorn et al

Roos et al. describe the bleaching or whitening of a dairy product by using a lipoxygenase. Lipoxygenase does not have a direct effect on pigments, but instead only an indirect effect. Thus, an ordinarily skilled person would not arrive at the presently claimed invention by the combining Zorn et al and Roos et al.

4. Conclusions

The pending claims are patentably unobvious over the applied publications of record. Withdrawal of the substantive rejections advanced under 35 USC §103(a) is therefore in order.

**MUTSAERS et al**  
Serial No. 10/584,921  
May 18, 2011

**5. Fee Authorization**

The Commissioner is hereby authorized to charge any deficiency, or credit any overpayment, in the fee(s) filed, or asserted to be filed, or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Account No. 14-1140.

Respectfully submitted,

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